

Aluminium

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(Redirected from Aluminum)

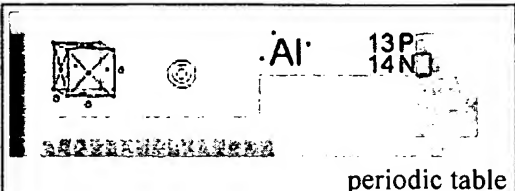

Aluminium or **aluminum** (see the spelling section below) is the chemical element in the periodic table that has the symbol **Al** and atomic number 13. It is a silvery and ductile member of the poor metal group of chemical elements. Aluminium is found primarily as the ore bauxite and is remarkable for its resistance to corrosion (due to the phenomenon of passivation) and its light weight. Aluminium is used in many industries to make millions of different products and is very important to the world economy. Structural components made from aluminium and its alloys are vital to the aerospace industry and very important in other areas of transportation and building in which light weight, durability, and strength are needed.

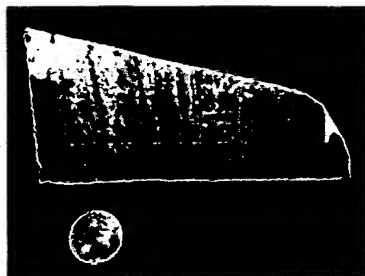
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Properties

Aluminium is a soft and lightweight metal with a dull silvery appearance, due to a thin layer of oxidation that forms quickly when it is exposed to air. Aluminium is nontoxic (as the metal), non-magnetic, and non-sparking. Pure aluminium has a tensile strength of about 49 megapascals (MPa) and 400 MPa if it is formed into

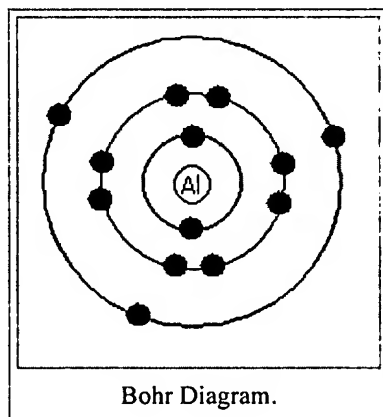
13	magnesium ← aluminium → silicon					
B ↑ Al ↓ Ga	<div></div> <div>periodic table</div>					
General						
Name, Symbol, Number		aluminium, Al, 13				
Chemical series		poor metals				
Group, Period, Block		13, 3, p				
Appearance		silvery <div></div>				
Atomic mass		26.9815386(8) g/mol				
Electron configuration		[Ne] 3s ² 3p ¹				
Electrons per shell		2, 8, 3				
Physical properties						
Phase		solid				
Density (near r.t.)		2.70 g/cm ³				
Liquid density at m.p.		2.375 g/cm ³				
Melting point		933.47 K (660.32 °C, 1220.58 °F)				
Boiling point		2792 K (2519 °C, 4566 °F)				
Heat of fusion		10.71 kJ/mol				
Heat of vaporization		294.0 kJ/mol				
Heat capacity		(25 °C) 24.200 J/(mol·K)				
Vapor pressure						
<i>P</i> /Pa	1	10	100	1 k	10 k	100 k
at <i>T</i> /K	1482	1632	1817	2054	2364	2790
Atomic properties						
Crystal structure		cubic face centered				
Oxidation states		3 (amphoteric oxide)				
Electronegativity		1.61 (Pauling scale)				
Ionization energies (more)		1st: 577.5 kJ/mol				
		2nd: 1816.7 kJ/mol				



A piece of aluminium metal about 15 centimetres long, with a US penny included for scale.

an alloy. Aluminium is about one-third as dense as steel or copper; is malleable, ductile, and easily machined and cast; and has excellent corrosion resistance and durability due to

the protective oxide layer. Aluminium mirror finish has the highest reflectance of any metal in the 200-400 nm (UV), and the 3000-10000 nm (far IR) regions, while in the 400-700 nm visible range it is slightly outdone by silver, and in the 700-3000 (near IR) by silver, gold and copper. It is the second most malleable metal (after gold) and the sixth most ductile. Aluminium is a good heat conductor which is why it is used to make saucepans.



Bohr Diagram.

	3rd: 2744.8 kJ/mol				
Atomic radius	125 pm				
Atomic radius (calc.)	118 pm				
Covalent radius	118 pm				
Miscellaneous					
Magnetic ordering	paramagnetic				
Electrical resistivity	(20 °C) 26.50 nΩ·m				
Thermal conductivity	(300 K) 237 W/(m·K)				
Thermal expansion	(25 °C) 23.1 μm/(m·K)				
Speed of sound (thin rod)	(r.t.) (rolled) 5000 m/s				
Young's modulus	70 GPa				
Shear modulus	26 GPa				
Bulk modulus	76 GPa				
Poisson ratio	0.35				
Mohs hardness	2.75				
Vickers hardness	167 MPa				
Brinell hardness	245 MPa				
CAS registry number	7429-90-5				
Notable isotopes					
Main article: Isotopes of aluminium					
iso	NA	half-life	DM	DE (MeV)	DP
²⁶ Al	syn	7.17×10 ⁵ y	β ⁺	1.17	²⁶ Mg
			ε	-	²⁶ Mg
			γ	1.8086	-
²⁷ Al	100%	Al is stable with 14 neutrons			
References					

Applications

Whether measured in terms of quantity or value, the use of aluminium exceeds that of any other metal except iron, and it is important in virtually all segments of the world economy.

Pure aluminium has a low tensile strength, but readily forms alloys with many elements such as copper, zinc, magnesium, manganese and silicon (e.g.duralumin). Today almost all materials that claim to be aluminium are actually an alloy thereof. Pure aluminium is encountered only when corrosion resistance is more important than strength or hardness. Conversely, the term "alloy" in general use today usually means aluminium alloy.

When combined with thermo-mechanical processing aluminium alloys display a marked improvement in mechanical properties. Aluminium alloys form vital components of aircraft and rockets as a result of their high strength to weight ratio.

Aluminium is an excellent reflector (~99%) of visible light and a good reflector (~95%) of infrared. A thin layer of aluminium can be deposited onto a flat surface by chemical vapor deposition or chemical means to form optical coatings and mirrors. These coatings form an even thinner layer of protective aluminium oxide that does not deteriorate as silver coatings do. Nearly all modern mirrors are made using a thin coating of aluminium on the